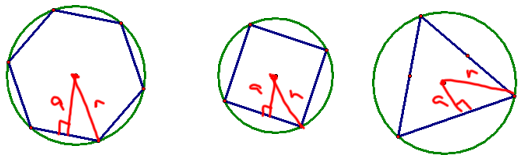
11-3 Areas of Regular Polygons and Circles

Any regular polygon can be inscribed in a circle.

Radius--from center to vertex
Apothem--from the center and perpendicular to one side



Area = ½a p

example 1:
regular hexagon
side = 8 cm

a - apothem
P - perimeter of polygon

30	60	90
4	$4\sqrt{3}$	8

① Find central ∠
$360 \div n = 6 = 60°$

② Find a.
$a = 4\sqrt{3}$

$P = 48$

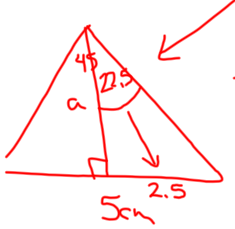
$A = \frac{1}{2} 4\sqrt{3} \cdot 48$

$= 96\sqrt{3}\ cm^2$

Area = ½a p

example 2:
regular octagon
side = 5 cm

central ∠ = 45



$\tan = \frac{opp}{adj}$

$\tan 22.5 = \frac{2.5}{a}$

$2.5 = a(\tan 22.5)$

$\frac{2.5}{\tan(22.5)} = a$

$6.04 = a$

$A = \frac{1}{2} a p$

$\frac{1}{2} 6.04 \cdot 40$

$A = 120.7\ cm^2$

Area = ½a p

example 3:
regular triangle
apothem = 4 cm

Area = ½a p

example 4:
regular pentagon
perimeter = 90 cm

÷5 = 18

Central ∠ =

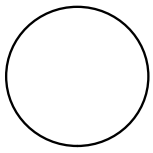
$\tan 36 = \frac{9}{a}$

$12.4 = a$

$A = \frac{1}{2}12.4(90)$

$A = 557.4\ cm^2$

Area of a circle= πr^2



r = 4 cm

$A = 16\pi\ cm^2$

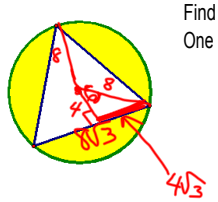
Find the area of the shaded region.
The radius is 8 cm.

$A_{circle} - A_{sq.}$

$64\pi - (8\sqrt{2})^2$

-128

$A = 73.1\ cm^2$



Find the area of the shaded region.
One side of the triangle is 8 $\sqrt{3}$ cm.

$A_{circle} - A_{\triangle}$

$64\pi - 48\sqrt{3}$

$A = 117.9\ cm^2$

$A = \frac{1}{2} 12 \cdot 8\sqrt{3}$

$48\sqrt{3}$

HW
p613-614

8-14, 16, 30